

Noise Monitoring Assessment

Willow Tree Gravels Quarry
Willow Tree, NSW
October 2022



Document Information

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Prepared for: Regional Group Australia Pty Ltd



Prepared by: Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

P: +61 2 4920 1833

www.mulleracoustic.com

Document ID	Date	Prepared By	Signed	Reviewed By	Signed
MAC190985-04RP1	17 October 2022	Louis Abell		Oliver Muller	

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Regional Group Australia Pty Ltd (RGA) to complete a Noise Monitoring Assessment (NMA) for Willow Tree Gravels Quarry (the 'quarry'), Willow Tree, NSW.

The monitoring has been conducted in accordance with Condition L4 of the quarry's Environment Protection Licence (EPL#5154) at seven nominated monitoring locations. This assessment has been undertaken during October 2022 and represents the annual noise monitoring program for the quarry.

The assessment has been conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Environment Protection Licence (EPL), #5154; and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

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2 EPL Noise Monitoring Locations and Criteria

2.1 Locality

The quarry is located on Merriwa Road, approximately 2km south west of Willow Tree, NSW. Receivers in the locality surrounding the quarry are primarily rural residential while the surroundings of the quarry predominantly include farming pastures. The monitoring locations with respect to the quarry are presented in the locality plan shown in **Figure 1**.

2.2 Noise Monitoring Locations

Seven monitoring locations have been selected as part of the NMA in accordance with Condition L4 of the project EPL. The selected monitoring locations are presented in **Table 1**.

Table 1 Monitoring Locations (MGA56)			
EPA Point	Location	Easting, m	Northing, m
2	R1	284075	6494233
3	R2	284459	6494906
4	R3	284594	6495335
5	R4	284568	6495611
6	R5	284445	6495852
7	R6	283589	6496186
8	R7	280122	6493756

2.3 Noise Criteria

Condition L4.1 of the quarry's EPL outlines the applicable noise criteria for the nominated monitoring locations surrounding the quarry site.

Table 2 reproduces relevant criteria for each of the receivers as outlined in the quarry's EPL.

Table 2 Noise Criteria		
EPA Point	Location	Noise Limits dB(A) – Day-LAeq(15minute)
2, 3, 7	R1, R2, R6	37
4, 5, 6	R3, R4, R5	45
8	R7	35

Note 1: Receiver locations are shown in Figure 1.

KEY

- R1 ASSESSED LOCATION
- APPROXIMATE PROJECT LOCATION

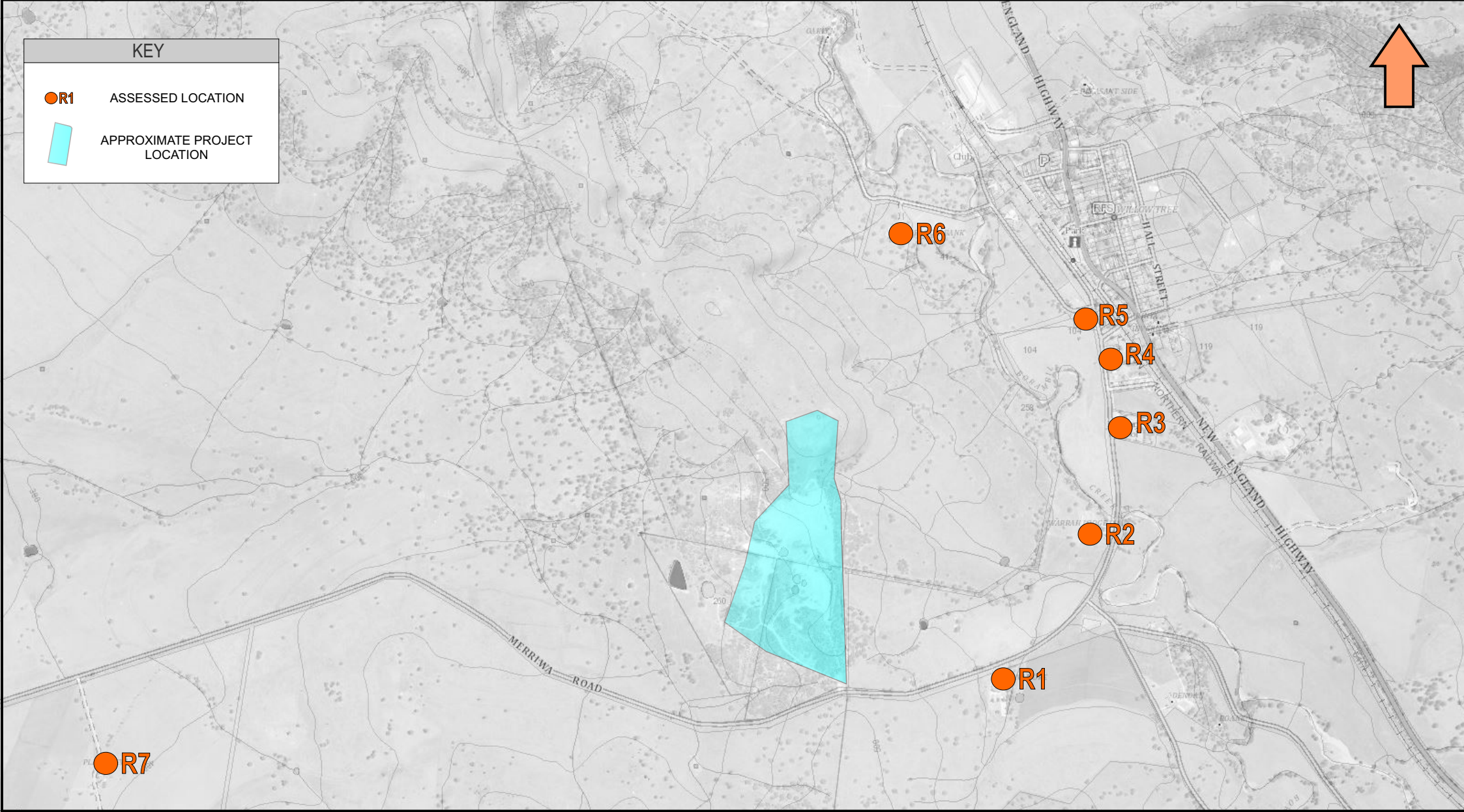


FIGURE 1
LOCALITY PLAN
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3 Methodology

3.1 Assessment Methodology

Attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise and the NPI. Measurements were carried out using a Svantek Type 1, 971 noise analyser on Tuesday 11 October 2022. Acoustic instrumentation used carries current NATA calibration and complies with AS/NZS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA.

One daytime measurement was conducted at each of the seven monitoring locations during normal quarrying operations.

Measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source.

Extraneous noise sources were excluded from the analysis to determine the $L_{Aeq}(15min)$ noise contribution for comparison against the relevant criteria. Where the quarry was inaudible, the contribution is estimated to be at least 10dB below the ambient noise level.

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4 Assessment Results

The monitored noise level contributions and observed meteorological conditions for each monitoring location are presented in **Table 3**.

Table 3 Operator-Attended Noise Survey Results – Tuesday 11 October 2022

Location	Time (hrs)	Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
		L _{Amax}	L _{Aeq}	L _{A90}		
R1	10:31	90	64	30	WD: SW	Birds 32-50
					WS: <0.5m/s	Passing Traffic 75-90
					Rain: Nil	Quarry Not Audible
Willow Tree Gravels Quarry L _{Aeq} (15min) Contribution						<30
R2	11:35	80	50	34	WD: SW	Birds 30-52
					WS: <0.5m/s	Agricultural Noise 38-40
					Rain: Nil	Passing Traffic 43-52
Willow Tree Gravels Quarry L _{Aeq} (15min) Contribution						<30
R3	10:51	82	61	35	WD: SW	School Children 35-56
					WS: <0.5m/s	Passing Traffic 70-82
					Rain: Nil	Quarry Not Audible
Willow Tree Gravels Quarry L _{Aeq} (15min) Contribution						<30
R4	11:10	79	56	39	WD: SW	Birds 30-38
					WS: <0.5m/s	Industrial Workshop Noise 40-45
					Rain: Nil	Passing Traffic 67-79
Willow Tree Gravels Quarry L _{Aeq} (15min) Contribution						<30
R5	11:55	66	46	37	WD: SW	Birds 35-60
					WS: <0.5m/s	Passing Traffic 38-66
					Rain: Nil	Lawnmower 40-42
Willow Tree Gravels Quarry L _{Aeq} (15min) Contribution						<30
R6	12:21	69	49	35	WD: SW	Birds 40-42
					WS: <0.5m/s	Distant Traffic 35-40
					Rain: Nil	Passing Traffic 68-69
Willow Tree Gravels Quarry L _{Aeq} (15min) Contribution						<30
R7	10:10	90	62	27	WD: SW	Birds 30-53
					WS: <0.5m/s	Distant Traffic 30-32
					Rain: Nil	Passing Traffic 68-90
Willow Tree Gravels Quarry L _{Aeq} (15min) Contribution						<30

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

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5 Discussion and Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Noise Monitoring Assessment (NMA) for Regional Group Australia Pty Ltd. The assessment was completed to determine the quarry's compliance with the relevant criteria outlined in the site's Environment Protection License (EPL#5154) for the nominated residential receivers during October 2022.

Quarry noise emissions were inaudible during the noise measurement conducted on Tuesday 11 October 2022 at all assessment locations except location R7, where quarry noise was barely audible (<30dBA). Quarry noise contributions were estimated to satisfy the daytime EPL noise criteria with a site contribution of <35dBA for all monitoring locations. Ambient noise levels were primarily attributed to non-project related sources, including road traffic, birds and agricultural noise (farming).

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Appendix A - Glossary of Terms

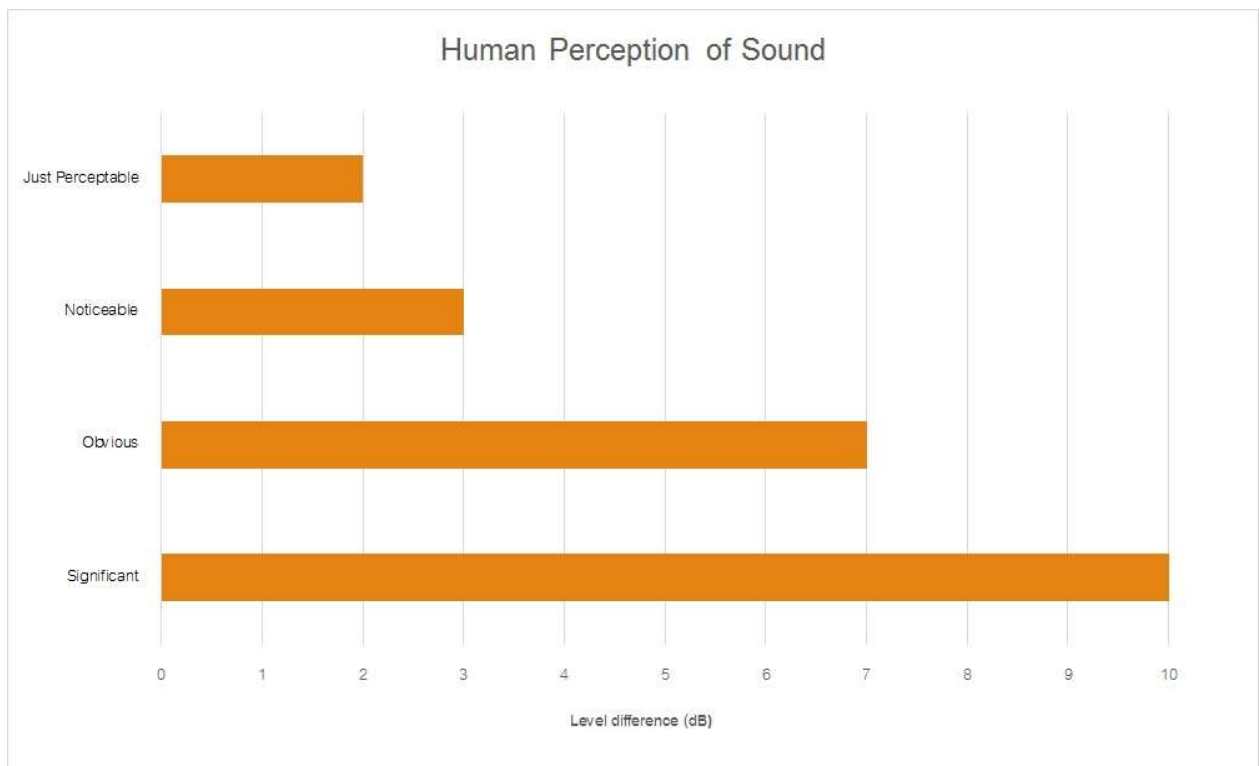
Table A1 provides a number of technical terms have been used in this report.

Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAm _{ax}	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : $= 10 \cdot \log_{10} (W/W_0)$ <p>Where : W is the sound power in watts and W₀ is the sound reference power at 10-12 watts.</p>

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA	
Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



Muller Acoustic Consulting Pty Ltd

PO Box 678, Kotara NSW 2289

ABN: 36 602 225 132

Ph: +61 2 4920 1833

www.mulleracoustic.com

